

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-9. (Cancelled)

10. (New) A method of simulating a chemical mechanical polishing process, said method comprising:

obtaining a first dataset, which includes two-dimensional pattern density distribution data derived from expanding pattern density data in two dimensions based on coordinate data, and outputting said first dataset as a two-dimensional pattern density distribution image;

obtaining a second dataset which includes two-dimensional height distribution data derived from multiplying said first dataset and a first measured thickness of a laminated film laminated on a semiconductor substrate;

obtaining a third dataset which includes two-dimensional Fourier transformation data derived from Fourier-transforming said first dataset;

obtaining a fourth dataset which includes said two-dimensional Fourier transformation data of said third dataset spatial-filtered such that only a component having a predetermined spatial frequency passes through;

obtaining a fifth dataset which includes two-dimensional reverse Fourier transformation data derived from reverse Fourier-transforming said fourth dataset;

obtaining a sixth dataset which includes two-dimensional height distribution data derived from multiplying said fifth dataset and a second measured thickness of said laminated film laminated on said semiconductor substrate; and

simulating said chemical mechanical polishing process by performing a least squares analysis to obtain a first correlation coefficient indicating a degree of correlation between said second dataset and said first measured thickness of said laminated film, and adjusting said first correlation coefficient to cause said second dataset to match said first measured thickness of said laminated film; and

simulating said chemical mechanical polishing process by performing a least squares analysis to obtain a second correlation coefficient indicating a degree of correlation between said sixth dataset and said second measured thickness of said laminated film, and adjusting said second correlation coefficient to cause said sixth dataset to match said second measured thickness of said laminated film.

11. (New) The method according to claim 10, comprising:

obtaining a first calculated dataset which includes two-dimensional pattern density data containing information about a pattern density per unit region of a fabrication pattern in a pattern forming process of a semiconductor device;

obtaining a first measured dataset which includes two-dimensional height distributions on said semiconductor substrate that are measured before a chemical mechanical polishing process is executed with respect to said pattern forming process;

obtaining a second measured dataset which includes two-dimensional height distributions on said semiconductor substrate that are measured after a chemical

mechanical polishing process is executed with respect to said pattern forming process;

comparing said first measured dataset with first calculated data about a two-dimensional distribution of a topography on said semiconductor substrate before said chemical mechanical polishing process is executed, said first calculated data being calculated from said pattern density data;

obtaining a first correlation coefficient, which is derived by a least squares analysis, and performing a parameter fitting such that a square of said first correlation coefficient becomes a maximum;

comparing said second measured dataset with second calculation data about a two-dimensional distribution of a topography on said semiconductor substrate after said chemical mechanical polishing process is executed, said second calculation data being from said pattern density data; and

obtaining a second correlation coefficient, which is derived by a least squares analysis, and performing a parameter fitting such that a square of said second correlation coefficient becomes a maximum.

12. (New) The method according to claim 11, further comprising:

adjusting sampling meshes of said first and second measured data so as to match a mesh of said pattern density two-dimensional distribution image.

13. (New) The method according to claim 11, further comprising:

obtaining third measured data about a height distribution of a topography of an under laid layer of said fabrication pattern which is measured before forming said fabrication pattern; and

adding said third measured data to said first and second calculated data, respectively.

14. (New) The method according to claim 13, further comprising:

adjusting sampling meshes of said first, second and third measured data so as to match a mesh of said pattern density two-dimensional distribution image.

15. (New) The method according to claim 10, comprising:

calculating a two-dimensional pattern density distribution by expanding said pattern density data in two dimensions based on said coordinate data, and outputting said expanded pattern density data as said pattern density two-dimensional distribution image;

calculating a height distribution that obtains first calculated data by executing an operation of multiplying a pattern density at individual parts of said pattern density two-dimensional image by a thickness of a laminated film laminated on said pattern density two-dimensional distribution image; and

obtaining second calculated data by

(i) calculating, based on said first calculated data, a two-dimensional distribution image of a polishing pad in a state that said polishing

pad used in said chemical mechanical polishing process of said laminated film is pressed against said laminated film,

(ii) calculating a two-dimensional distribution image of stress exerted on said polishing pad based on said two-dimensional distribution image of said polishing pad, and

(iii) calculating a two-dimensional distribution image of irregularities after polishing said laminated film based on said two-dimensional distribution of said stress.

16. (New) The method according to claim 15, further comprising:

receiving third measured data about a height distribution of a topography of an under laid layer of said fabrication pattern which is measured before forming said fabrication pattern; and

adding said third measured data to said first calculated data.

17. (New) The method according to claim 15, further comprising:

adjusting sampling meshes of said first and second measured datasets so as to match a mesh of said pattern density two-dimensional distribution image.

18. (New) The method according to claim 16, further comprising:

adjusting sampling meshes of said first, second and third measured data so as to match said mesh of said pattern density two-dimensional distribution image.